APPENDIX A

CLAIMS

What is claimed is:

1. An apparatus for incorporating decision making into classifiers to provide efficient test recommendations, the apparatus comprising:

a. an explicit system and a classifier each configured to receive a system state dataset the explicit system connected with the classifier and operative to iteratively perform a combinatory search procedure based on the system state dataset to develop a next test recommendation for the classifier, whereby the classifier performs the next test to generate an objective weighted score;

b. a profit module connected with the classifier and with the explicit system to receive the objective weighted score from the classifier, to add subjective value to the objective weighted score to determine a profit for the test, and to provide the profit to the explicit system to enable the explicit system to i. assess the value of its next test recommendation and ii. to iteratively generate a best test recommendation based on the maximization of the profit;

c. an implicit system configured to receive a system state dataset, and connected with the explicit system to receive the best test recommendation for each system state dataset, and to act as a function estimator to learn to associate best test recommendations with the system state dataset in order to mimic the explicit system, thereby to enable rapid decision making in situations that are either urgent or well-known.

2. An apparatus for incorporating decision making into classifiers to provide efficient test recommendations as set forth in claim **1**, wherein the explicit system and the implicit system are configured to provide test recommendations to a controller.

3. An apparatus for incorporating decision making into classifiers to provide efficient test recommendations as set forth in claim **1**, wherein the implicit system is a neural network.

4. An apparatus for incorporating decision making into classifiers to provide efficient test recommendations at set forth in claim **3**, wherein the neural network is a radial basis neural network.

5. An apparatus for incorporating decision making into classifiers to provide efficient test recommendations as set forth in claim **3**, wherein the combinatory search procedure performed by the explicit system is simulated annealing.

6. An apparatus for incorporating decision making into classifiers to provide efficient test recommendations as set forth in claim **5**, wherein the explicit system and the profit module may be separated from the apparatus after the implicit system sufficiently mimics the explicit system.

7. An apparatus for incorporating decision making into classifiers to provide efficient test recommendations as set forth in claim **1,** wherein the system state is a vector.

8. An apparatus for incorporating decision making into classifiers to provide efficient test recommendations as set forth in claim **1**, wherein the classifier is a probabilistic model.

9. An apparatus for incorporating decision making into classifiers to provide efficient test recommendations as set forth in claim **8**, wherein the classifier is Bayesian.

10. A computerized method for enhancing decision making in a classifier system, wherein the classifier system includes an explicit system and a classifier, each

configured to receive a system state dataset, with the explicit system connected with the classifier; a profit module connected with the classifier and with the explicit system; and an implicit system configured to receive a system state dataset, and connected with the explicit system, the computerized method comprising the steps of:

a. receiving a system state dataset in the explicit system, the classifier, and the implicit system;

b. determining in the explicit system, based on the feature set, a recommended test;

c. performing the recommended test on the classifier;

d. determining, via the profit module, the profit from the test performed on the classifier;

e. detecting whether the test performed on the classifier maximizes the profit;

f. performing the receiving step a through the detecting step e until a test is found which maximizes the profit;

g. training the implicit system with the system state dataset and the test which maximizes the profit; and

h. repeating steps a through g until a desired level of training of the implicit system is reached.

11. A computerized method for enhancing decision making in a classifier system as set forth in claim **10**, wherein the test that maximizes the profit is provided by either the explicit system or the implicit system to a controller.

12. A computerized method for enhancing decision making in a classifier system as set forth in claim **10**, wherein the implicit system used is a neural network.

13. A computerized method for enhancing decision making in a classifier system as set forth in claim **12**, wherein the implicit system used is a radial basis neural network.

14. A computerized method for enhancing decision making in a classifier system as set forth in claim **12**, wherein the determining step b is performed by the explicit system using a combinatory search procedure.

15. A computerized method for enhancing decision making in a classifier system as set forth in claim **14**, wherein the combinatory search procedure performed by the explicit system in the determining step b is simulated annealing.

16. A computerized method for enhancing decision making in a classifier system as set forth in claim **15**, wherein the explicit system and the profit module used may be separated from the classifier system after the implicit system sufficiently mimics the explicit system.

17. A computerized method for enhancing decision making into classifiers to provide efficient test recommendations as set forth in claim **10,** wherein the system state is a vector.

18. A computerized method for enhancing decision making into classifiers to provide efficient test recommendations as set forth in claim **10**, wherein the classifier is a probabilistic model.

19. A computerized method for enhancing decision making into classifiers to provide efficient test recommendations as set forth in claim **18**, wherein the classifier is Bayesian.

20. A computerized method for enhancing decision making in classifiers to provide efficient test recommendations, the computerized method comprising the steps of:

a. providing an explicit system and a classifier each configured to receive a system state dataset, with the explicit system connected with the classifier, and operative to iteratively perform a combinatory search procedure based on the system state dataset to develop a next test recommendation for the classifier, whereby the classifier performs the next test to generate an objective weighted score;

b. providing a profit module connected with the classifier and with the explicit system to receive the objective weighted score from the classifier, to add subjective value to the objective weighted score to determine a profit for the test, and to provide the profit to the explicit system to enable the explicit system to assess the value of its next test recommendation, and, iteratively, to generate a best test recommendation based on the maximization of the profit;

c. providing an implicit system configured to receive a system state dataset, and connected with the explicit system to receive the best test recommendation for each system state dataset, and to act as a function estimator to learn to associate best test recommendations with the system state dataset in order to mimic the explicit system, thereby to enable rapid decision making in situations that are either urgent or well-known.

21. A computerized method for enhancing decision making in a classifier system as set forth in claim **20**, wherein the explicit system and the implicit system are further configured to provide the test recommendation to a controller.

22. A computerized method for enhancing decision making in a classifier system as set forth in claim **20**, wherein the implicit system provided is a neural network.

23. A computerized method for enhancing decision making in a classifier system as set forth in claim **22**, wherein the implicit system provided is a radial bias neural network.

24. A computerized method for enhancing decision making in a classifier system as set forth in claim **22**, wherein the explicit system provided performs the combinatory search procedure by use of simulated annealing.

25. A computerized method for enhancing decision making in a classifier system as set forth in claim **24**, wherein the explicit system provided and the profit module provided may be separated from the classifier system provided after the implicit system sufficiently mimics the explicit system.

26. A computerized method for enhancing decision making in classifiers to provide efficient test recommendations as set forth in claim **20,** wherein the system state is a vector.

27. A computerized method for enhancing decision making in classifiers to provide efficient test recommendations as set forth in claim **20**, wherein the classifier is a probabilistic model.

28. A computerized method for enhancing decision making in classifiers to provide efficient test recommendations as set forth in claim **27**, wherein the classifier is Bayesian.